



Runsaround (Hard Solution)

Follow the directions carefully. One team will start at 0A and the other at 0B. As it turns out, the two teams are in lockstep:

Instructions	Pass	Instructions
0A The nearby cafe is Peet's. Its street address is 100, so $N = 16$. Head to the intersection of Mt Auburn and JFK, facing SE on Mt Auburn.		0B The nearby salon is X. On Tuesdays, it closes at 6 PM, so $N = 18$. Turn right onto Holyoke, walk until it hits Eliot St, then turn left.
16 Walk two blocks SE on Mt Auburn, then turn left on Holyoke. The sit-down restaurant is named Spice, so pass that. Its street number is 24, and the largest prime factor of 25 is 5.	SPICE \rightarrow	18 Walk SW on Eliot until you hit a three-way intersection. Turn right onto Bennett St, and walk one block. You will receive SPICE, which converts to $19 + 16 + 9 + 3 + 5 = 52$, which becomes 26.
5 Keep walking NNE on Holyoke until it hits Mass Ave. Turn right onto Mass Ave. You'll receive the word UNIVERSITY; the fourth-last letter is S, so the next instruction is 19.	\leftarrow UNIVERSITY	26 Walk forward one block (Bennett / University). The last word in the name of the crossing street is University, so pass that. $A = 18$, $X = 0$, so $N = 8$.
19 Walk one block forward to Holyoke and Linden. On the right is the Harvard University Book Store. Pass its street number, 1256. The sum of the digits is 14, which is the next instruction.	1256 \rightarrow	8 Turn right onto University, continue to University and Mt Auburn. Turn left, then walk straight until University and Story. You'll receive 1256 from the other team, so your next instruction is 6.
14 Continue straight ahead. Bear right at the fork, then turn right onto Bow St. You'll receive the word FULLER, which is 6 letters long, so your next instruction is 6.	\leftarrow FULLER	6 Continue ahead and take the first right NE onto Hilliard. Walk straight to the second intersection (Fuller St). Pass FULLER to the other team. Take the second letter that can be interpreted as a Roman numeral (the second L) and divide by 2 since L appears twice. Your next instruction is 25.
6 Continue ahead and take the first right onto Bow St WNW. Walk to the second intersection (Linden St). Pass LINDEN to the other team. The second letter that can be interpreted as a Roman number is the I, so your next instruction is 1.	LINDEN \rightarrow	25 Continue ahead until Hilliard and Brattle, and turn right onto Brattle SE. You will get the word LINDEN. The numerical values of the first and fourth letters are 12 and 4, so your next instruction is 16.
1 Continue ahead and take the second left, onto Holyoke SSW. You will receive FIRE from the other team. It has 4 letters, so your next instruction is 4.	\leftarrow FIRE	16 Continue straight and take the second left onto Church ENE. The sit-down restaurant on the right is Fire & Ice, so pass FIRE. The street number is 50, so $N = 17$.



4	Continue straight until you hit the end of Mill St. To your left is the number 50, so pass it. Turn around, walk forward, turn left onto South St. Walk just past the South St / Dunster St intersection. Take the second letter of South St (O) and convert to a number, so your next instruction is 15.	50 →	17	Continue straight on until the end of the road. Cross the street, and nearby there will a gate into Harvard, so enter. You'll get the number 50. Factorizing it, you get $2 * 5 * 5$, and the sum of those is 12, so that's your next instruction.
15	Continue on, then turn left onto JFK St SSW. Walk forward till JFK / Eliot. You'll receive the word HALL. The fourth letter is L, which is 12, so your next instruction is 11.	← HALL	12	Walk ahead until you hit a building (University Hall). Pass HALL to the other team. In the first word, the letter I appears twice, so your next instruction is 9.
11	Follow the street till you hit JFK Park. If you look at the inscription on the left, the letter A appears most in the left column, so pass the word A to the other team. The park was named for Kennedy, which has 7 letters, so that's your next instruction.	A →	9	Turn left, walking NNE along the west side of University Hall, then turn right just past it and continue straight until you hit Sever Hall. Turn right, facing SSW. You will receive the word A, so convert its first (and only) letter to a number (1) and add one. Your next instruction is 2.
7	Walk forward through the park until you can make a 90 degree right turn. Follow the path until you enter the King [something] of Thailand Square. Go to the nearest intersection (Eliot/Bennett), facing NNE on Eliot. You will receive the word WIDENER, which corresponds to $23 + 9 + 4 + 5 + 14 + 5 + 18 = 78$, so your next instruction is 26.	← WIDENER	2	Go straight on, passing between Widener Library on the right and a stairway on the left. On your right is Widener, so pass that to the other team. Continue through and turn right when you can, then left when you can (and out the gate), and right on Mass Ave (WNW). Walk two blocks and pass Holyoke St. The second letter of that is O, so your next instruction is 15.
26	Walk forward one block. You should be at Eliot St and Mt Auburn, at the SW corner of the triangle. Pass the last word of the crossing street (AUBURN) to the other team. Then, $A = 7$, $X = 1$, so $N = 26 - 7 - 1 = 20$, and that's your next instruction.	AUBURN →	15	Continue straight, and then turn left onto Dunster. Walk forward until Dunster hits Mt Auburn. You'll receive AUBURN from the other team. The fourth letter of the word is U, which corresponds to 21, so your next instruction is 20.
20	Turn right onto Mt Auburn, and keep walking till you get back to where you started.		20	Turn right onto Mt Auburn, and keep walking till you get back to where you started.

The steps taken by the two teams are given below. If you add up the twelve corresponding steps that are not 0A or 0B, you get the third row. The fourth row is the third row minus 26 if the number is greater than 26. Finally, turning that last row into a letter gets you the answer: HEAT EQUATION.

0A	16	5	19	14	6	1	4	15	11	7	26	20
0B	18	26	8	6	25	16	17	12	9	2	15	20
	34	31	27	20	31	17	21	27	20	9	41	40
	8	5	1	20	5	17	21	1	20	9	15	14
	H	E	A	T	E	Q	U	A	T	I	O	N